

Claims

1. A guide wire comprising a distal end side portion formed of a first metallic material, a proximal end side portion formed of a second metallic material higher in rigidity than said first metallic material, and
5 an intermediate portion provided between said distal end side portion and said proximal end side portion and formed of a mixture of said first metallic material and said second metallic material, wherein said intermediate portion comprises a gradient physical property portion in which the content of said first metallic material decreases and the
10 content of said second metallic material increases, from the distal end side toward the proximal end side.

2. The guide wire as set forth in claim 1, wherein the content of said second metallic material in said gradient physical property portion increases stepwise from the distal end side toward the proximal end side.

15 3. The guide wire as set forth in claim 1, wherein the content of said second metallic material in said gradient physical property portion increases continuously from the distal end side toward the proximal end side.

4. The guide wire as set forth in claim 1, wherein said first
20 metallic material is a Ni-Ti based alloy.

5. The guide wire as set forth in claim 1, wherein said second metallic material is a stainless steel.

6. The guide wire as set forth in claim 1, which comprises a coil portion so provided as to cover a distal end portion thereof.

25 7. The guide wire as set forth in claim 6, wherein said coil is formed of a contrast material.

8. The guide wire as set forth in claim 1, wherein at least a portion of an outer surface of said guide wire is coated with a resin.

9. The guide wire as set forth in claim 1, wherein a distal end
30 portion of said intermediate portion is formed only of said first metallic

material, and a proximal end portion of said intermediate portion is formed only of said second metallic material.

10. The guide wire as set forth in claim 1, wherein said intermediate portion is joined to said distal end side portion and said proximal end side portion by welding.

11. The guide wire as set forth in claim 1, which is an integral body free of any joint portion.

12. A guide wire comprising a distal end side portion formed of a first metallic material, a proximal end side portion formed of a second metallic material higher in rigidity than said first metallic material, and an intermediate portion provided between said distal end side portion and said proximal end side portion and having a portion of formed of a mixture containing said first metallic material, said intermediate portion comprises a gradient physical property portion in which the content of said first metallic material decreases from the distal end side toward the proximal end side, a distal end portion of said intermediate portion is formed of said first metallic material, and said distal end portion of said intermediate portion is joined to said distal end side portion by welding.

13. A guide wire comprising a distal end side portion formed of a first metallic material, a proximal end side portion formed of a second metallic material higher in rigidity than said first metallic material, and an intermediate portion provided between said distal end side portion and said proximal end side portion and having a portion of formed of a mixture containing said first metallic material and said second metallic material, and said portion of said intermediate portion is that the content of said first metallic material decreases from the distal end side toward the proximal end side and the content of said second metallic material increases from the distal end side toward the proximal end side, a distal end portion of said intermediate portion is formed of

said first metallic material, and a proximal end portion of said intermediate portion is formed of said second metallic material, and said distal end portion of said intermediate portion is joined to said distal end side portion by welding and said proximal end portion of said intermediate portion is joined to said proximal end side portion by one of welding, soldering or brazing.

14. A guide wire comprising a distal end side portion formed of a first metallic material, a proximal end side portion formed of a second metallic material higher in rigidity than said first metallic material, and an intermediate portion provided between said distal end side portion and said proximal end side portion and containing said first metallic material and said second metallic material, said intermediate portion comprises a gradient physical property portion in which the content of said first metallic material decreases from the distal end side toward the proximal end side, and in which the content of said second metallic material increases from the distal end side toward the proximal end side, a distal end portion of said intermediate portion is formed only of said first metallic material, and a proximal end portion of said intermediate portion is formed only of said second metallic material, and said distal end portion of said intermediate portion is joined to said distal end side portion by welding and said proximal end portion of said intermediate portion is joined to said proximal end side portion by one of welding, soldering or brazing.

15. A method of manufacturing a guide wire comprising a distal end side portion formed of a first metallic material, a proximal end side portion formed of a second metallic material higher in rigidity than said first metallic material, and an intermediate portion provided between said distal end side portion and said proximal end side portion and formed of a mixture of said first metallic material and said second metallic material, said method comprising the steps of: preparing a distal

end side portion forming wire material made of said first metallic material, and a proximal end side portion forming wire material made of said second metallic material; charging a mold with a powder of said first metallic material and a powder of said second metallic material so
5 that the content of said first metallic material powder increases and the content of said second metallic material powder decreases, from one side toward the other side; sintering the metallic powder charge to produce an intermediate portion forming member comprising a gradient physical property portion; and joining said proximal end side portion forming
10 wire material to one side of said intermediate portion forming member and joining said distal end side portion forming wire material to the other side of said intermediate portion forming member.

16. The method of manufacturing a guide wire as set forth in claim 15, wherein said metallic powder charging step comprising
15 charging said mold with said first metallic material powder and said second metallic material powder so as to form a plurality of layers in which the content of said first metallic material in said charge increases stepwise and the content of said second metallic material in said charge decreases stepwise.

20 17. The method of manufacturing a guide wire as set forth in claim 15, wherein said metallic powder charging step comprising charging said mold with said first metallic material powder and said second metallic material powder so that the content of said first metallic material in said charge increases continuously and that the content of
25 said second metallic material in said charge decreases continuously.

18. The method of manufacturing a guide wire as set forth in claim 15, wherein said metallic powder charging step is conducted under the condition where a second metallic member formed of said second metallic material is disposed on one side in the inside of said mold,
30 while a first metallic member formed of said first metallic material is

disposed on the other side in the inside of said mold, and said charge is pressed between both said metallic members.

19. The method of manufacturing a guide wire as set forth in claim 15, wherein said sintering is conducted by a plasma discharge sintering method.

20. The method of manufacturing a guide wire as set forth in claim 15, wherein said first metallic material is a Ni-Ti based alloy.

21. The method of manufacturing a guide wire as set forth in claim 15, wherein said second metallic material is a stainless steel.

22. A method of manufacturing a guide wire comprising a distal end side portion formed of a first metallic material, a proximal end side portion formed of a second metallic material higher in rigidity than said first metallic material, and an intermediate portion provided between said distal end side portion and said proximal end side portion and formed of a mixture of said first metallic material and said second metallic material, said method comprising a step of continuously extruding into a filamentous shape a kneaded forming material containing a metallic powder for forming said guide wire, and a step of sintering the filamentous body thus extruded, said kneaded forming material extruding step comprising: a distal end side portion forming material extruding stage for extruding a material containing said first metallic powder into a filamentous shape; a proximal end side portion forming material extruding stage for extruding a material containing said second metallic powder into a filamentous shape; and an intermediate portion forming material extruding stage which is provided between, and continuous with, said distal end side portion forming material extruding stage and said proximal end side portion forming material extruding stage and which is for extruding a material containing said first metallic powder and said second metallic powder, wherein during said intermediate portion forming material extruding

stage, the extrusion is so conducted that the content of said first metallic powder in the intermediate portion forming material decreases and the content of said second metallic material in the intermediate portion forming material increases, as said proximal end side portion forming material extruding stage is approached.

23. The method of manufacturing a guide wire as set forth in claim 22, wherein said kneaded forming material contains a binder, and said method comprises a step of removing said binder from the extrudate, after said extruding step and before said sintering step.

24. The method of manufacturing a guide wire as set forth in claim 22, wherein said first metallic material is a Ni-Ti based alloy.

25. The method of manufacturing a guide wire as set forth in claim 22, wherein said second metallic material is a stainless steel.